New Jersey Department of Environmental Protection
Division of Science and Research
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Water Monitoring Project
Water Monitoring Management

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RE-EVALUATION REPORT

August 1998

SHELLFISH GROWING AREA #SE-3

CORSONS SOUND & CORSONS INLET

1992 - 1997

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SHELLFISH GROWING AREA SE-3

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1992 - 1997

New Jersey Department of Environmental Protection
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EXECUTIVE SUMMARY

The last sanitary survey that covered this area was done in July 1996. That report covered data from 1988 through 1995. Since this area is sampled under the Systematic Random Sampling protocol, 30 samples per station are required to classify the waters. Therefore, this report will include water quality data collected from 1992 through January 1998. The data collected was consistent with the existing shellfish growing water classification for area SE-3. Therefore all areas will remain under the current classification.

INTRODUCTION

PURPOSE

This report is part of a series of studies having a dual purpose. The first and primary purpose is to comply with the guidelines of the National Shellfish Sanitation Program (NSSP) that are established by the Interstate Shellfish Sanitation Conference (ISSC). Reports generated under this program form the basis for classifying shellfish waters for the purpose of harvesting shellfish for human consumption. As such, they provide a critical link in protecting human health.

The second purpose is to provide input to the State Water Quality Inventory Report, which is prepared pursuant to Section 305(b) of the Federal Clean Water Act (P.L. 95-217). The information contained in the growing area reports is used for the New Jersey State Water Quality Inventory Report (305b) which provides an assessment to Congress every two years of current water quality conditions in the State's major rivers, lakes, estuaries, and ocean waters. The reports provide valuable information for the 305(b) report, which describes the waters that are attaining state designated water uses and national clean water goals; the pollution problems identified in surface waters; and the actual or potential sources of pollution. Similarly, the reports utilize relevant information contained in the 305(b) report, since the latter assessments are based on instream monitoring data (temperature, oxygen, pH, total and fecal coliform bacteria, nutrients, solids, ammonia and metals), land-use profiles, drainage basin characteristics and other pollution source information.

From the perspective of the Shellfish Classification Program, the reciprocal use of water quality information from reports represent two sides of the same coin: the growing area report focuses on the estuary itself, while the 305(b) report describes the watershed that drains to that estuary.

The Department participates in a cooperative National Environmental Performance Partnership System (NEPPS) with the USEPA which emphasizes ongoing evaluation of issues associated with environmental regulation, including assessing impacts on waterbodies and measuring improvements in various indicators of environmental health. The shellfish growing area reports are intended to provide a brief assessment of the

growing area, with particular emphasis on those factors that affect the quantity and quality of the shellfish resource. As the Department implements a comprehensive watershed management program in conjunction with the NEPPS initiative, the shellfish growing area reports provide valuable information on the overall quality of the saline waters in the most downstream sections of each major watershed. In addition, the reports assess the quality of the biological resource and provide a reliable indicator of potential areas of concern and/or areas where additional information is needed to accurately assess watershed dynamics.

HISTORY

As a brief history, the NSSP developed from public health principles and program controls formulated at the original conference on shellfish sanitation called by the Surgeon General of the United States Public Health Service in 1925. This conference was called after oysters were implicated in causing over 1500 cases of typhoid fever and 150 deaths in 1924. The tripartite cooperative program (federal, state and shellfish industry) has updated the program procedures and guidelines through workshops held periodically until 1977. Because of concern by many states that the NSSP guidelines were not being enforced uniformly, a delegation of state shellfish officials from 22 states met in 1982 in Annapolis, Maryland, and formed the ISSC. The first annual meeting was held in 1983 and continues to meet annually at various locations throughout the United States.

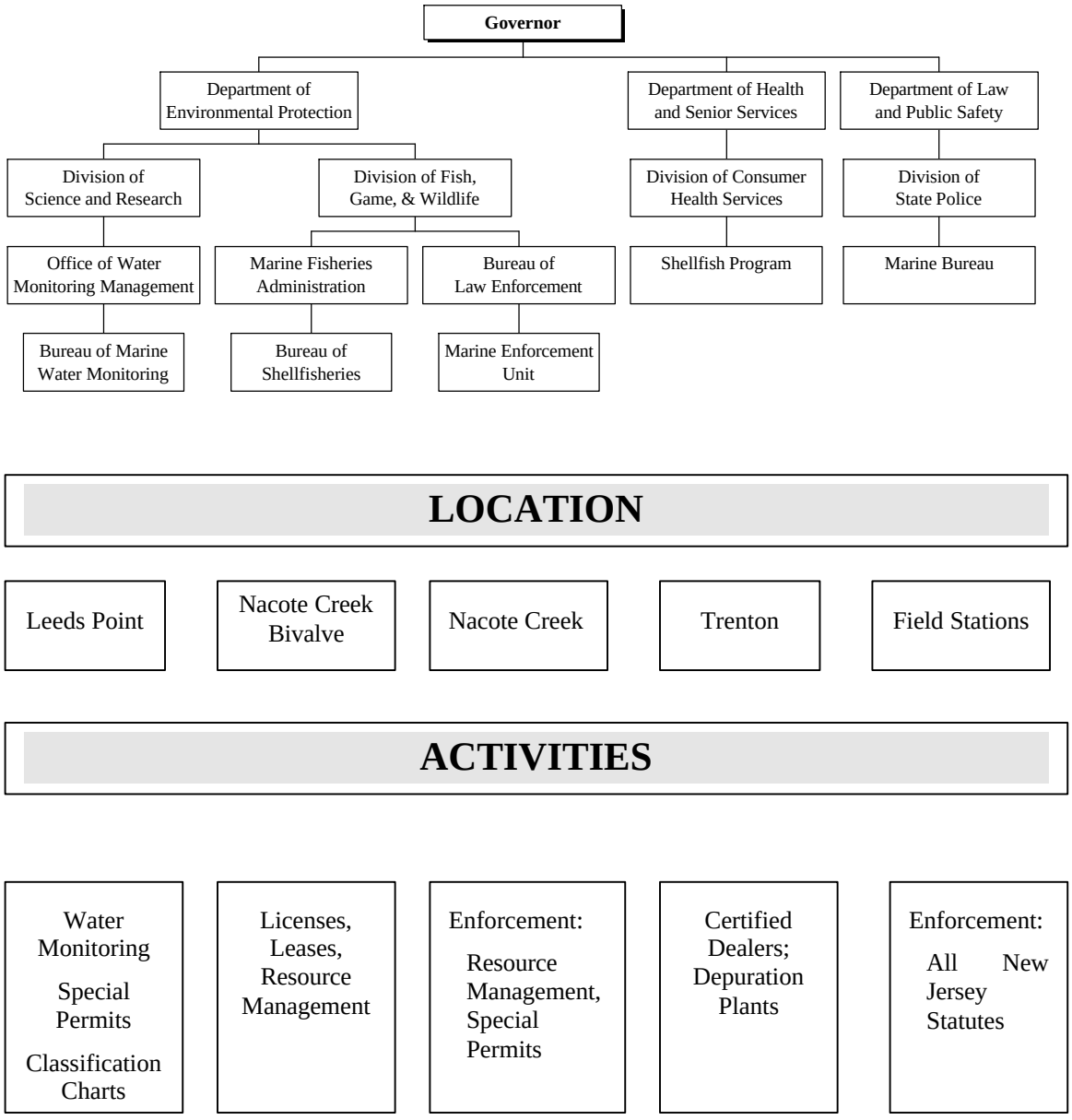
The NSSP *Guide for the Control of Molluscan Shellfish* sets forth the principles and requirements for the sanitary control of shellfish produced and shipped in interstate commerce in the United Stated. They provide basis used by the Federal Food and Drug Administration (FDA) in evaluating state shellfish sanitation programs. There are five major points on which the state is evaluated by the FDA include:

1. The classification of all actual and potential shellfish growing areas as to their suitability for shellfish harvesting.
2. The control of the harvesting of shellfish from areas that are classified as restricted, prohibited or otherwise closed.
3. The regulation and supervision of shellfish resource recovery programs.
4. The ability to restrict the harvest of shellfish from areas in a public health emergency, and
5. Prevent the sale, shipment or possession of shellfish that cannot be identified as being produced in accordance with the NSSP and have the ability to condemn, seize or embargo such shellfish.

FUNCTIONAL AUTHORITY

The authority to carry out these functions is divided between the Department of Environmental Protection (DEP), the Department of Health and Senior Services and the Department of Law and Public Safety.

Figure 1: STATE OF NEW JERSEY SHELLFISH AGENCIES



The Bureau of Marine Water Monitoring (BMWM) under the authority of N.J.S.A. 58:24 classifies the shellfish growing waters and administers the special resource recovery programs. Regulations delineating the growing areas are promulgated at N.J.A.C. 7:12 and are revised annually. Special Permit rules are also found at N.J.A.C. 7:12 and are revised as necessary.

The Bureau of Shellfisheries in the Division of Fish, Game and Wildlife issues harvesting licenses and leases for shellfish grounds under the Authority of N.J.S.A. 50:2 and

N.J.A.C. 7:25. This bureau in conjunction with the BMWM administers the Hard Clam Relay Program.

The Bureau of Law Enforcement in the DEP (Division of Fish, Game, and Wildlife) and the Division of State Police in the Department of Law and Public Safety enforce the provisions of the statutes and rules mentioned above.

The Department of Health is responsible for the certification of wholesale shellfish establishments and in conjunction with the BMWM, administers the depuration program.

IMPORTANCE OF SANITARY CONTROL OF SHELLFISH

Emphasis is placed on the sanitary control of shellfish because of the direct relationship between pollution of shellfish growing areas and the transmission of diseases to humans. Shellfish borne infectious diseases are generally transmitted via a fecal-oral route. The pathway is complex and quite circuitous. The cycle usually begins with fecal contamination of the shellfish growing waters. Sources of such contamination are many and varied. Contamination reaches the waterways via runoff and direct discharges.

Clams, oysters and mussels pump large quantities of water through their bodies during the normal feeding process. During this process the shellfish also concentrate microorganisms, which may include pathogenic microbes, and toxic heavy metals/chemicals. It is imperative that a system is in place to reduce the human health risk of consuming shellfish from areas of contamination.

Accurate classifications of shellfish growing areas are completed through a comprehensive sanitary survey. The principal components of the sanitary survey report include:

1. An evaluation of all actual and potential sources of pollution,
2. An evaluation of the hydrography of the area and
3. An assessment of water quality. Complete intensive sanitary surveys are conducted every 12 years with interim narrative evaluations completed on a three-year basis. If major changes to the shoreline or bacterial quality occur, then the intensive report is initiated prior to its l2 year schedule.

The following narrative constitutes this bureau's assessment of the above mentioned components and determines the current classification of the shellfish growing waters.

DESCRIPTION

Area SE-3 is located in Cape May County and includes the area from Peck Bay up to but not including Ludlam Bay, (see Figure 2). This area can be found on Chart #8 of the "State of New Jersey-Shellfish Growing Water Classification Charts" (NJDEP 1998). The principal water bodies found in Area SE-3 are Corsons Sound, Corsons Inlet, Middle Thorofare, Whale Creek, Main Channel, Flat Creek, Ben Hands Thorofare and Crook

Horn Creek. It is bordered by three municipalities, which are Strathmere, Upper Township and the southern end of Ocean City. The population statistics for these municipalities are shown in Table 1.

LOCATION

Figure 2: Location of Shellfish Growing Area SE-3

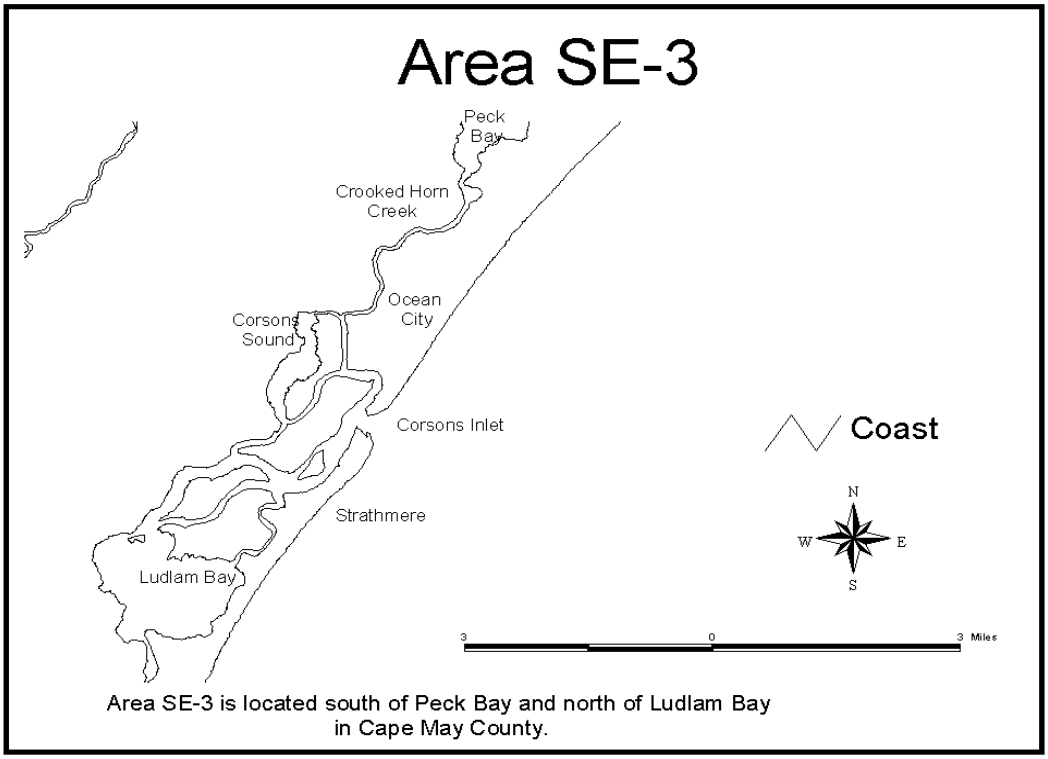


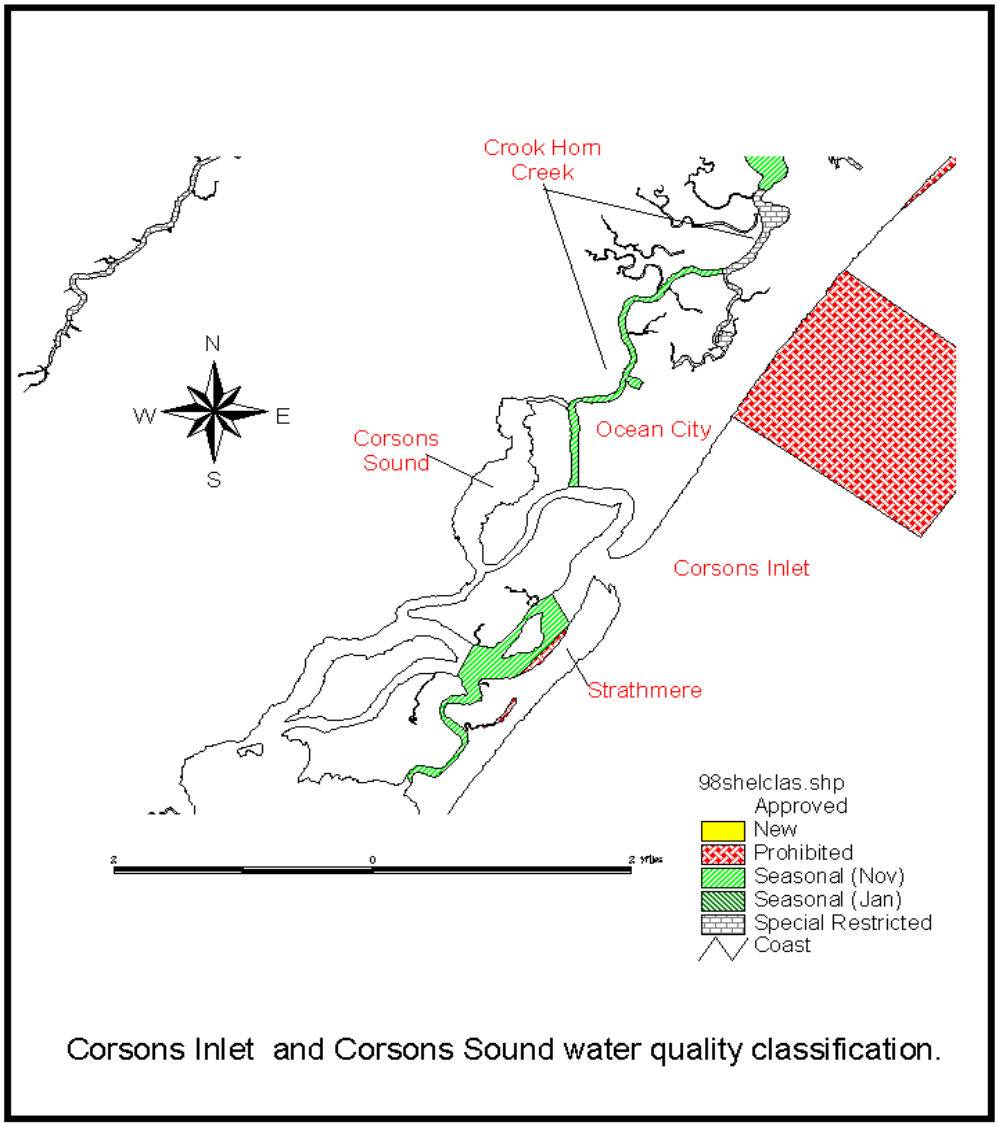
Table 1: Summary of Population Statistics

MUNICIPALITY	POPULATION		POPULATION DENSITY (#/sq mi)		AREA SQUARE MILE
	Year-Round	Summer	year-round	Summer	
Strathmere	163	1,630	271	2,717	.60
Ocean City	15,512	150,000	1,360	13,146	11.41
Upper Township (excluding Strathmere)	10,518	10,518	155	155	68.00

HISTORY OF AREA SE-3

The majority of area SE-3 is classified as Approved or Seasonally Approved. The last Sanitary Survey for this area was dated July 1996, and covered water quality data collected through 1995. In that report 90 acres of water in Crook Horn Creek were upgraded from Special Restricted to Seasonally Approved.

Figure 3: Area SE-3 classification



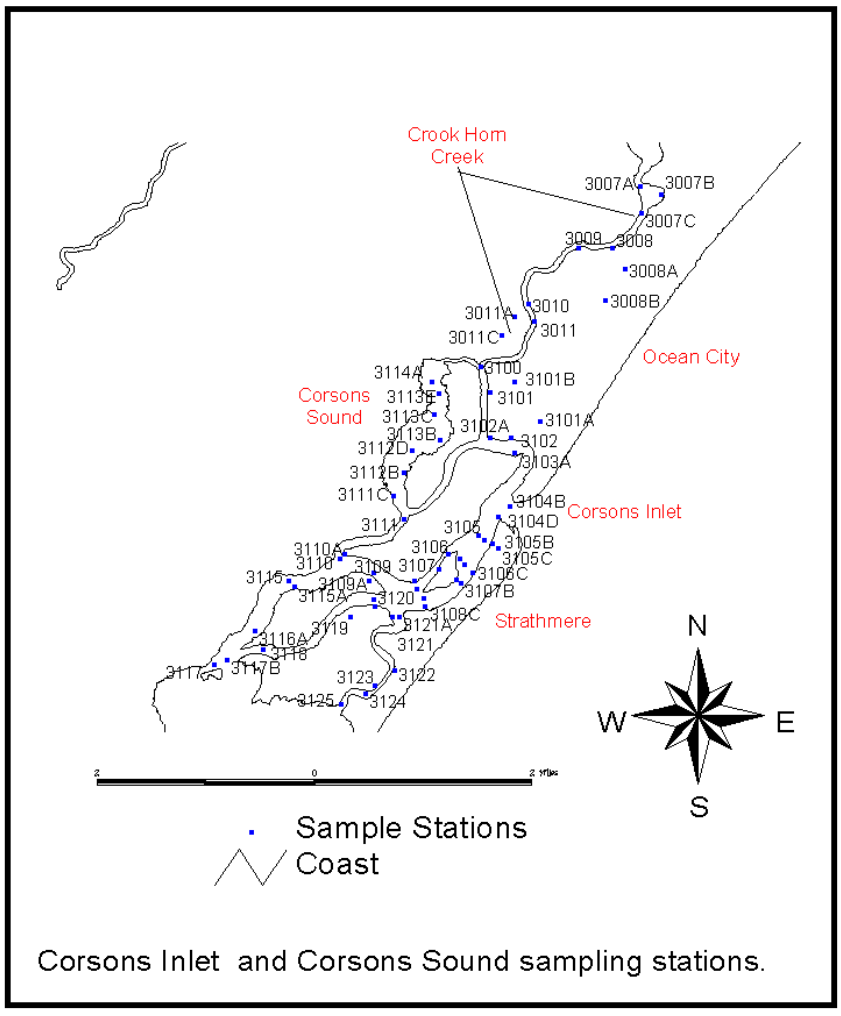
Corsons Inlet and Corsons Sound water quality classification.

METHODS

Water sampling was performed in accordance with the Field Procedures Manual (NJDEP, 1992).

Approximately 2874 water samples were collected for total and fecal coliform bacteria between 1992 and 1998 and analyzed by the three tube MPN method according to APHA (1970). Figure 4 shows the Shellfish Growing Water Quality monitoring stations in the Corsons Sound, Corsons inlet area. Approximately 53 stations are monitored during each year.

Figure 4: Area SE-3 sampling stations



Corsons Inlet and Corsons Sound sampling stations.

Water quality sampling, shoreline and watershed surveys were conducted in accordance with the NSSP Manual of Operations, Part I, Appendix B (USPHS, 1995).

Data management and analysis was accomplished using database applications developed for the Bureau. Mapping of pollution data was performed with the Geographic Information System (GIS:ARCVIEW).

BACTERIOLOGICAL INVESTIGATION AND DATA ANALYSIS

The water quality of each growing area must be evaluated before an area can be classified as *Approved*, *Seasonally Approved*, *Special Restricted*, or *Seasonal Special Restricted*. Criteria for bacterial acceptability of shellfish growing waters is provided in *the NSSP Guide for the Control of Molluscan Shellfish*. Each shellfish producing state is directed to adopt either the total coliform criterion, or the fecal coliform criterion. While New Jersey bases its growing water classifications on the total coliform criterion, it does make corresponding fecal coliform determinations for each sampling station, these data are viewed as adjunct information and are not directly used for classification. The State Shellfish Control Authority also has the option of choosing one of the two water monitoring sampling strategies for each growing area.

The Adverse Pollution Condition Strategy requires that a minimum of five samples be collected each year under conditions that have historically resulted in elevated coliforms in the particular growing area. The results must be evaluated by adding the individual station sample results to the preexisting bacteriological sampling results to constitute a data set of at least 15 samples for each station. The adverse pollution conditions usually are related to tide, and rainfall, but could be from a point source of pollution or variation could occur during a specific time of the year. Under this strategy, for *Approved* waters, the total coliform median or geometric mean MPN of the water shall not exceed 70 per 100 mL and not more than 10 percent of the samples exceed an MPN of 330 per 100 mL for the 3-tube decimal dilution test. For *Special Restricted* waters, the total coliform median or geometric mean MPN of the water shall not exceed 700 per 100 mL and not more than 10 percent of the samples exceed an MPN of 3300 per 100 mL for the 3-tube decimal dilution test. Areas to be Approved under the Seasonal classification must be sampled and meet the criterion during the time of the year that it is approved for the harvest of shellfish.

The Systematic Random Sampling strategy requires that a random sampling plan be in place before field sampling begins and can only be used in areas that are not affected by point sources of contamination. A minimum of six samples per station are to be collected each year and added to database to obtain a sample size of 30 for statistical analysis. The bacteriological quality of every sampling station in *Approved* areas shall have a total coliform median or geometric mean MPN not exceeding 70 per 100 mL and the estimated 90th percentile shall not exceed an MPN of 330 per 100 mL. For *Special Restricted* areas, the bacteriological quality shall not exceed a total coliform median or geometric mean MPN of 700 per 100 mL and the estimated 90th percentile shall not exceed an MPN of 3,300 per 100 mL.

Area SE-3 is sampled under the Systematic Random Sampling strategy described above.

MARINE BIOTOXINS

The Department collects samples at regular intervals throughout the summer to determine the occurrence of marine biotoxins. This data is evaluated weekly by the Bureau of Marine Water Monitoring in accordance with the NSSP Guide for the Control of Molluscan Shellfish requirements. An annual report is compiled by the Bureau of Freshwater and Biological Monitoring. There are no recorded instances of sufficient levels of biotoxic plankton to cause toxicity in shellfish tissue in this area.

SHORELINE SURVEY

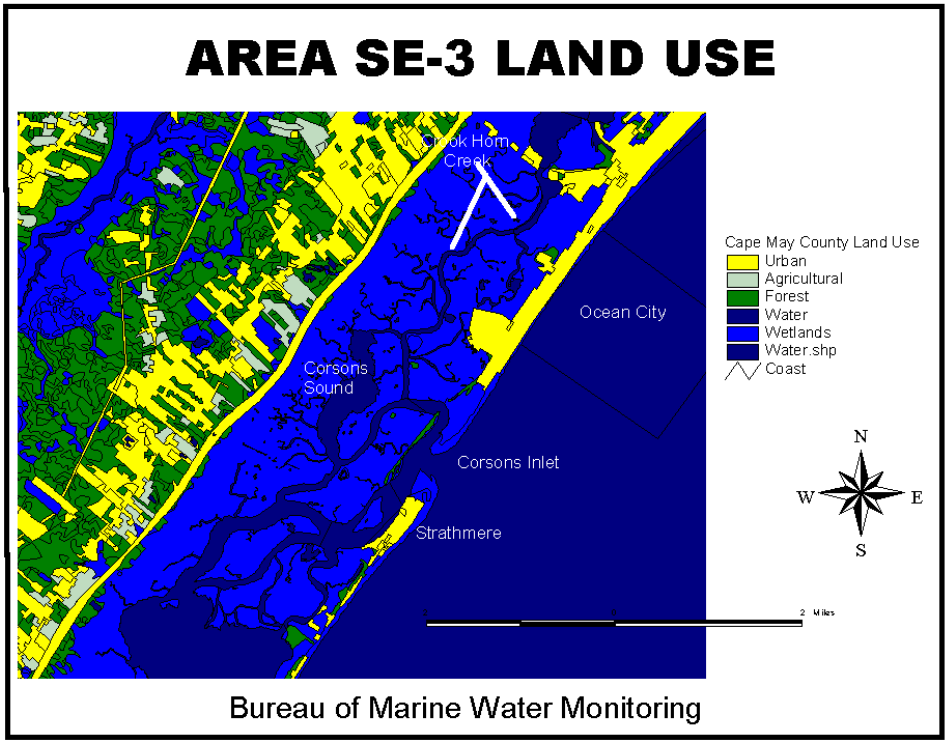
EVALUATION OF BIOLOGICAL RESOURCES

A shoreline investigation can be found in the Sanitary Survey dated July 1996. There have been no significant changes since that survey.

LAND USE

The northern end of SE-3 is bordered by Ocean City which is a resort area. There is also significant boating activity during the summer. The majority of the area surrounding the major waterways in SE-3 are wetlands, (see figure 5).

Figure 5: Area SE-3 Land Use map



CHANGES SINCE LAST SURVEY

There have been no major changes in the SE-3 area since the last report written in July 1996. However, there has been discussions within the local township in the area of Sea Isle and Strathmere concerning the possibility of eventually extending the existing sewerage interceptor to service Strathmere. However, if the line is extended, it could result in classification upgrades to the surrounding water.

IDENTIFICATION AND EVALUATION OF SOURCES

Marinas

Marina facilities have the potential to affect the suitability of shellfish growing areas for the harvest of shellfish. The biological and chemical contamination associated with marina facilities may be of public health significance. New Jersey defines a marina as "any structure (docks, piers, bulkheads, floating docks, etc.) that supports five or more boats, built on or near the water, which is utilized for docking, storing, or otherwise mooring vessels and usually but not necessarily provides services to vessels such as repairing, fueling, security or other related activities" and designates the confines of the marina as *Prohibited* for the harvest of shellfish. Adjacent waters are classified using a dilution analysis formula.

It is recognized by the National Shellfish Sanitation Program, Manual of Operations, Part1, Section C-9, that there are significant regional differences in all factors that affect marina pollutant loading. The manual therefore allows each state latitude in applying specified occupancy and discharge rates. The NSSP guidelines assume the worst case scenario for each factor.

There are 5 marinas in area SE-3, as shown in Table 2 and Figure 6. The waters enclosed by the marina are classified as Prohibited; depending on the size of the marina and the water quality, water immediately adjacent to each marina may be classified as Prohibited, Special Restricted, or Seasonally Approved (no harvest during the summer months when the marina is active). Marina buffer zones were calculated using the formula below. The size of each buffer zone is shown in Table 2 and Figure 6.

Table 2 : Marinas in Area SE-3

Marina Name	Wet slips Total/Boats >24ft.	Location	Buffer Radius (ft)	Depth (ft)
Blue Water Marina	155/98	Ocean City	924	27
Deauville Inn Dock	44/10	Upper Twp.	528	14
Franks Boat Yard	3/0	Upper Twp.	42	13
Corsons Inlet Marina	24/1	Upper Twp.	346	12
Whale Creek Marina	62/0	Upper Twp.	1293	6

Equation 1 :Marina Buffer Equation. (adapted from FDA. 1989):

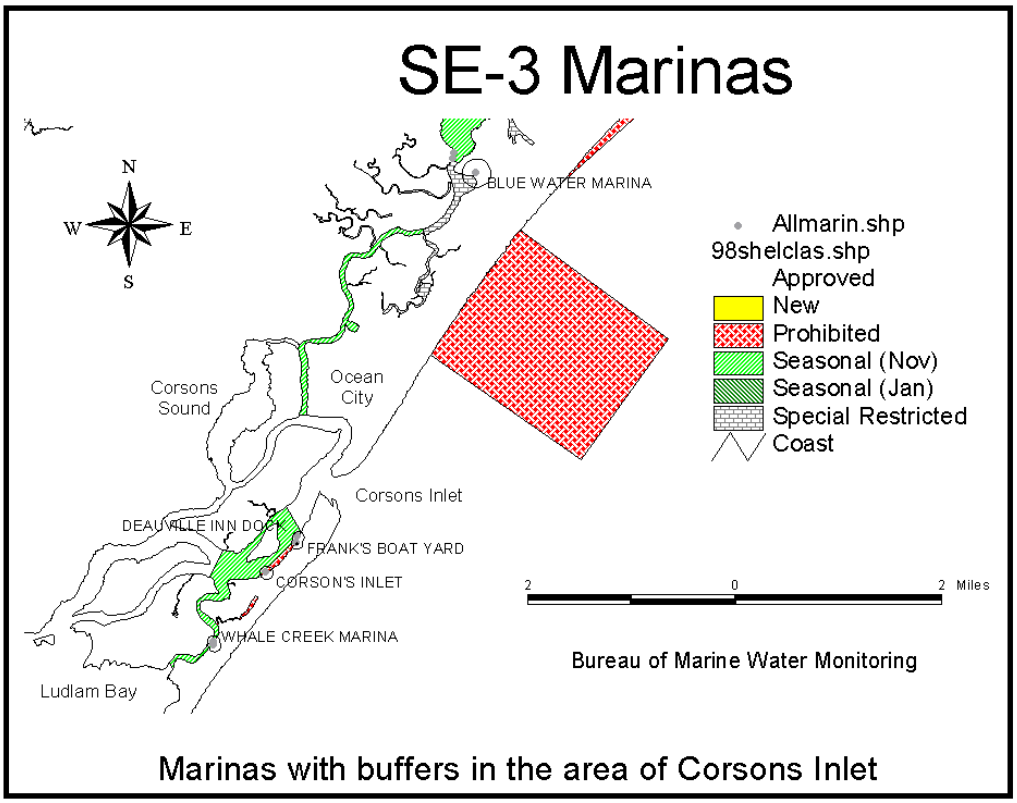
$$BufferRadius(ft) = \sqrt{\frac{2x10^{9}(FC/person/day)x2(person/boat)x[(.25slips \geq 24') + (0.065 \times slips < 24')]x2}{140000(FC/M^{3})xdepth(ft)x0.3048(M/ft)xpx2(tides/day)}}x3.28(ft/M)$$

Explanation of terms in equation:

Fecal coliform per person per day:	2×10^{9}
Number of people per boat:	2
For slips able to accommodate boats > 24 feet (combination of factors yields multiplier of 0.25):	
Number of slips occupied:	50%
Number of boats occupied:	50%
For boats < 24':	6.5% discharge waste
Angle of shoreline:	180^{o}, which results in factor of 2
Number of tides per day:	2
Depth in meters:	depth in feet x conversion factor
Water quality to be achieved:	140000 FC/meter ^{3}
Convert meters to feet:	3.28

Marina buffer zones may be calculated using the formula above, or may be determined using a dilution analysis computer program developed by the State of Virginia and the USFDA. The computer program is used for complex configurations where the formula is unlikely to provide the needed accuracy.

Figure 6: Marinas, Showing Buffer Zones Surrounding Marinas.



HYDROGRAPHY AND METEOROLOGY

Area SE-3 is bordered primarily by marsh and development to the east and west. It consists of two main water bodies which are Corsons Sound and Corsons Inlet. The waters in Corsons Sound are relatively shallow with depths averaging ½ to 1 feet (MLW). The waters in Crook Horn Creek and Middle Thorofare average from 8 to 10 feet (MLW). Waters in Main Channel and Flat Creek have average depths from 10 to 17 feet (MLW). The tides in this area are diurnal (twice a day), with an average range of 5 feet. Most of the tidal exchange is through Corsons Inlet.

Precipitation inputs to the area for the period 1992 through January 1998 are shown in Table 3. There have been no significant changes in hydrography since the 1996 report. The primary weather station for this area is Atlantic City. The secondary weather station for this area is Pomona. The secondary station data is used when data from the primary station is incomplete.

Table 3: Climatological Data

CLIMATOLOGICAL DATA

Rainfall Recorded at NOAA's Atlantic City Station

Sampling Date	Precipitation in Inches			
	Sampling day	1 day prior	2 days prior	3 days prior
06/09/92	0.030	0.260	0.260	0.310
07/07/92	0.000	0.040	0.040	0.510
08/11/92	0.240	0.240	0.340	0.340
08/13/92	0.470	0.470	0.710	0.710
10/14/92	0.000	0.000	0.000	0.020
12/08/92	0.000	0.000	0.000	0.230
02/23/93	0.000	0.000	0.600	0.600
03/18/93	0.000	0.000	0.000	0.340
04/06/93	0.000	0.000	0.000	0.080
06/09/93	0.000	0.130	0.130	0.130
06/11/93	0.000	0.000	0.000	0.130
07/20/93	0.050	1.060	1.060	1.060
10/13/93	0.000	0.970	0.970	1.070
11/16/93	0.000	0.000	0.000	0.040
12/13/93	0.000	0.000	0.230	0.520
03/30/94	0.000	0.690	2.400	2.960
04/11/94	0.000	0.300	0.300	0.300
05/09/94	0.000	0.170	0.560	0.620
05/24/94	0.000	0.120	0.120	0.120
06/13/94	0.000	0.000	0.000	0.000
06/15/94	0.230	0.230	0.230	0.230
07/06/94	0.000	0.000	0.000	0.850
09/13/94	0.000	0.000	0.000	0.630
10/26/94	0.000	0.000	0.000	0.690
11/21/94	0.600	0.600	0.600	1.010
12/19/94	0.000	0.000	0.090	0.090
03/02/95	0.000	0.000	0.340	3.350
03/21/95	0.330	0.330	0.330	0.330
03/30/95	0.010	0.010	0.010	0.010
05/08/95	0.000	0.000	0.000	0.040
05/16/95	0.000	0.020	0.290	0.290
06/26/95	0.000	0.120	0.140	0.920
07/18/95	0.070	0.440	0.620	0.620
08/14/95	0.000	0.000	0.020	0.020
09/19/95	0.000	0.310	2.360	2.360
10/23/95	0.000	0.000	1.110	1.110
10/24/95	0.000	0.000	0.000	1.110
06/06/96	0.000	0.210	-1.000	-1.000
07/29/96	0.000	0.000	0.040	0.280
08/01/96	0.280	0.290	0.330	0.330
08/19/96	0.000	0.490	0.490	0.490

Sampling Date	Precipitation in Inches			
	Sampling day	1 day prior	2 days prior	3 days prior
09/10/96	0.000	0.01.	0.010	0.010
09/16/96	0.000	0.000	0.010	0.140
09/19/96	0.080	0.200	3.470	3.470
10/09/96	1.970	2.600	2.600	2.600
10/21/96	0.080	0.830	-1.000	-1.000
12/16/96	0.000	0.240	1.540	1.890
01/30/97	0.000	0.510	0.670	0.670
02/26/97	0.000	0.000	0.000	0.040
05/19/97	0.000	0.000	0.000	0.040
06/17/97	0.000	0.000	0.000	0.550
06/25/97	0.000	0.000	0.430	0.430
07/10/97	0.280	0.280	0.280	0.280
08/19/97	0.390	-1.000	-1.000	-1.000
08/20/97	0.200	-1.000	-1.000	-1.000
09/23/97	0.000	0.000	0.550	0.550
09/24/97	0.000	0.000	0.000	0.550
10/15/97	0.120	0.120	0.120	0.120
11/10/97	0.080	0.630	1.180	1.300

A designation of "-1.000" indicates that no data was available for that date from either weather station. Although precipitation data was not available for several dates, there is no reason to suspect that the effect of precipitation would have been significantly different at those times than at any other time. Therefore, the analysis was completed without those data.

WATER QUALITY STUDIES

BACTERIOLOGICAL QUALITY

The raw data listings and statistical summaries according to National Shellfish Sanitation Program (NSSP) criteria are given in the appendix. There were no stations that exceeded the NSSP criteria applicable to the classification of each area.

INTERPETATION AND DISCUSSION OF DATA

BACTERIOLOGICAL

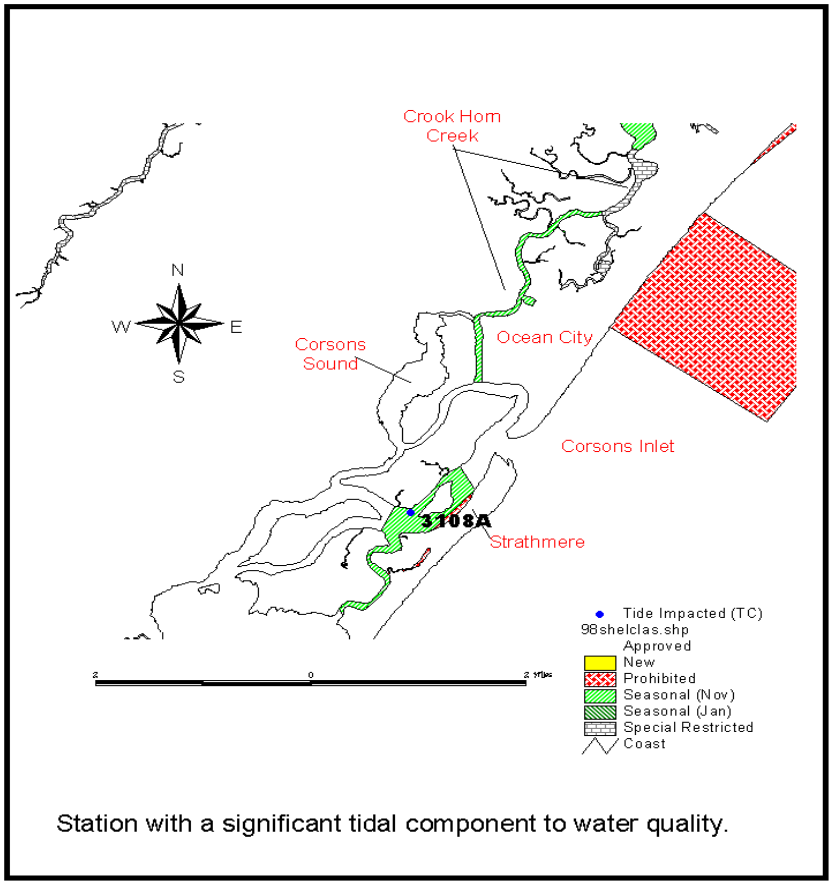
Criteria for bacterial acceptability of shellfish growing waters is provided in the NSSP Guide for the Control of Molluscan. Each shellfish producing state is directed to adopt either the total coliform or the fecal coliform criteria for growing water classifications. Historically, New Jersey based growing water classifications on the total coliform criteria and is using these criteria currently.

The total coliform median or geometric mean MPN (most probable number) does not exceed 70 per 100 mL and not more than 10% of the samples exceed an MPN of 330 per 100mL when using the three tube decimal dilution test. The total coliform standard need not be applied if it can be shown by detailed study verified by laboratory findings that the coliforms are not of direct fecal origin and do not indicate a public health hazard.

While New Jersey does make corresponding fecal coliform determinations for each total coliform determination, this data is viewed as adjunct information and is not directly used for classification.

A significant tidal component to water quality was found at only one of the 53 stations in Area SE-3, (see Table 4 and Figure 7). The station was located in the area of Strathmere and showed a higher geometric mean during Ebb tide. However, since this station represents less than 2% of the stations in the area it does not justify the need for this area to be listed as an Ebb tide priority sampling area.

Figure 7: SE-3 Ebb & Flood Tidal Conditions



Station with a significant tidal component to water quality.

Table 4: T-test comparing total coliform MPN values under Ebb and Flood tide conditions.

Station	Number of Samples		Geometric Mean Total Coliform MPN		Prob>[T][1]
	Ebb	Flood	Ebb	Flood	
3108A	39	10	7.7	4.1	0.0421

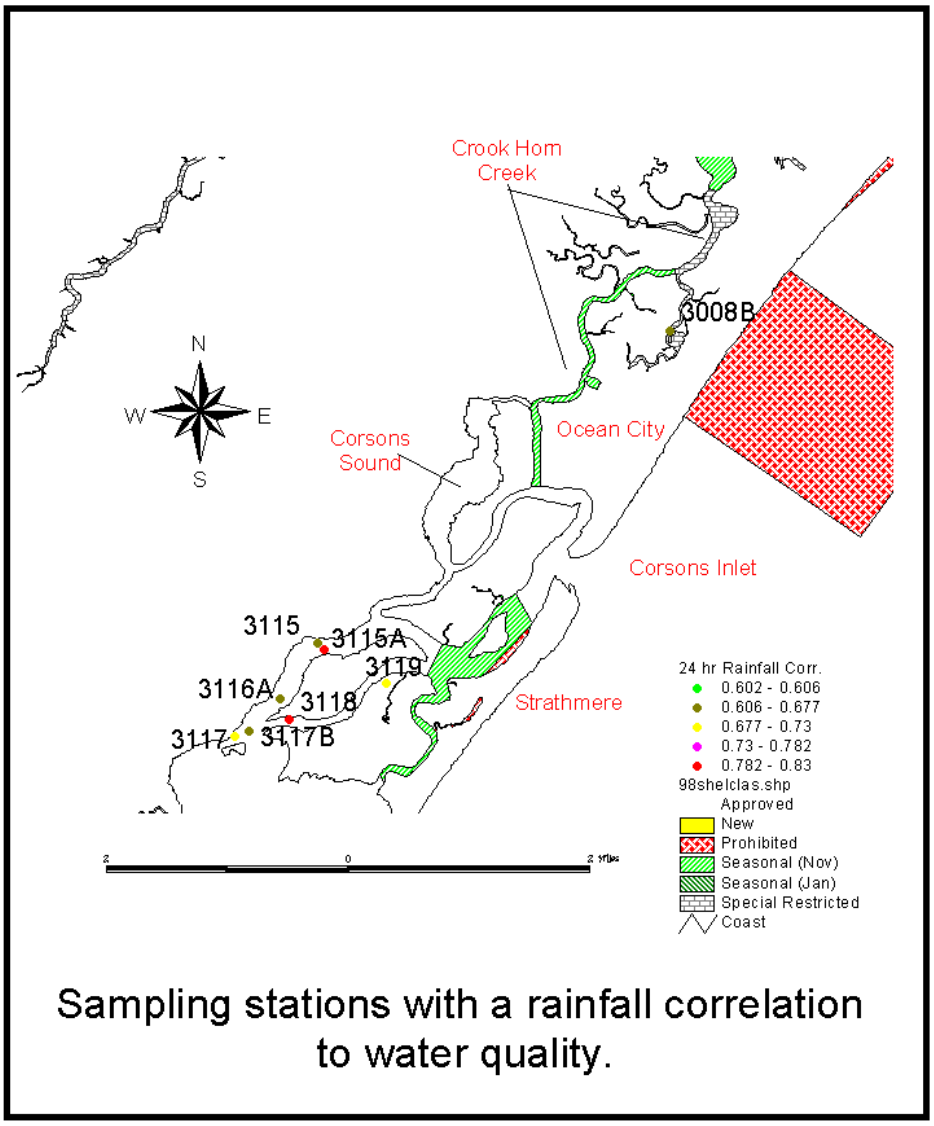
A significant correlation between total coliform MPN and rainfall was found to occur at 8 out of the 53 stations sampled in area SE-3, (15% of stations sampled), (see Figure 8 and Table 5). One station was located in Crook Horn Creek while the other seven stations were located in Main Channel and Flat Creek. All of the stations showed a correlation with rainfall on one day prior to sampling. Additionally, six of the seven stations in Main Channel and Flat Creek also showed a correlation on the day of sampling. Although 15% of the stations sampled are rainfall impacted the area is not classified as rainfall priority for sampling. This is because the areas that are rainfall impacted are in locations where there are no point source discharges. Therefore, the Systematic Random Sampling protocol can give a more accurate representation of the water quality.

Table 5: Correlation of total coliform MPN values with cumulative rainfall.

Station	Correlation of total coliform with rainfall			Number of Observations
	Day of Sampling	24 hours prior	48 hours prior	
3008A	0.2671	0.6181	0.4838	51
3115	0.5200	0.6384	0.4270	29
3115A	0.7662	0.8204	0.4476	29
3116A	0.6059	0.6750	0.3175	29
3117	0.6184	0.7239	0.5042	29
3117B	0.6378	0.6244	0.3055	29
3118	0.7296	0.7923	0.4767	29
3119	0.6449	0.7208	0.3722	29

[1] T-test significance level (probability of a greater T statistic with equal means).

Figure 8: Rainfall Correlation



There were five stations that showed a seasonal effect. These stations were located throughout area SE-3, in Crook Horn Creek, Main Channel, Corsons Sound, Whale Creek and off the coast of Strathmere. All of the stations were consistently higher during the summer than the winter, (see Table 6). Although these stations had a higher coliform

value in the summer they were still consistent with the present water quality classification.

Table 6: Seasonal Evaluation

EVALUATION OF SUMMER VS WINTER DATA			
Station	**Geo. Mean Summer**	**Geo. Mean Winter**	**t-Probability**
3007B	19.2	7.1	0.03958
3107A	9.9	4.8	0.04388
3109A	8.3	4.3	0.04353
3112D	10.5	4.5	0.03592
3123	9.3	5.2	0.05366

CONCLUSIONS

BACTERIOLOGICAL EVALUATION

The water quality in Area SE-3 is very good with all of the stations meeting NSSP total coliform criteria for the applicable classification. Although this area is in compliance there is still a potential for degradation of the waters due to failing septics in and around Strathmere. For this reason the classification will remain as listed.

RECOMMENDATIONS

BACTERIOLOGICAL EVALUATION

No change in water classification is recommended at this time for area SE-3. Although the water quality is very good there is still a large potential for degradation of waters along the coast of Strathmere based on the septic systems. This area is currently sampled under the Systematic Random Sampling protocol and it is recommended that this protocol be continued.

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